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1. Document ID: US 6258276 B1

L4: Entry 1 of 8 File: USPT Jul 10, 2001

US-PAT-NO: 6258276
DOCUMENT-IDENTIFIER: US 6258276 B1

TITLE: Microporous membranes and uses thereof

DATE-ISSUED: July 10, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Mika; Alicja M.	Hamilton			CAX
Childs; Ronald F.	Dundas			CAX
Dickson; James M.	Hamilton			CAX

US-CL-CURRENT: 210/638; 210/641, 210/651, 210/654

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw Desc | Image

2. Document ID: US 6120689 A

L4: Entry 2 of 8 File: USPT Sep 19, 2000

US-PAT-NO: 6120689
DOCUMENT-IDENTIFIER: US 6120689 A

TITLE: High purity water using triple pass reverse osmosis (TPRO)

DATE-ISSUED: September 19, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Tonelli; Anthony A.	Burlington			CAX
Deutschmann; Ake	Burlington			CAX
Wesno; Susan L	Burlington			CAX

US-CL-CURRENT: 210/652; 210/180, 210/641, 210/740, 210/746, 210/85, 210/96.2, 95/51

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw Desc | Image

3. Document ID: US 5997745 A

L4: Entry 3 of 8 File: USPT Dec 7, 1999

US-PAT-NO: 5997745
DOCUMENT-IDENTIFIER: US 5997745 A

TITLE: Method for producing high purity water using triple pass reverse osmosis TPRO

DATE-ISSUED: December 7, 1999

INVENTOR-INFORMATION: NAME	CITY	STATE	ZIP CODE	COUNTRY
Tonelli; Anthony A	Burlington			CAX
Deutschmann; Ake	Burlington			CAX
Nesno; Susan L	Burlington			CAX

US-CL-CURRENT: 210/652; 210/180, 210/195.2, 210/639, 210/746, 210/85, 210/96.2, 95/51

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Drawi Desc | Image

4. Document ID: US 5925255 A

File: USPT Jul 20, 1999

L4: Entry 4 of 8

US-PAT-NO: 5925255
DOCUMENT-IDENTIFIER: US 5925255 A

TITLE: Method and apparatus for high efficiency reverse osmosis operation

DATE-ISSUED: July 20, 1999

INVENTOR-INFORMATION: NAME	CITY	STATE	ZIP CODE	COUNTRY
Mukhopadhyay; Debasish	Palo Alto	CA	94306	

US-CL-CURRENT: 210/652; 210/638, 210/651, 210/661, 210/663

Full | Title | Citation | Front | Review | Classification | Date | Reference | KWIC | Drawi Desc | Image

5. Document ID: US 5858240 A

File: USPT Jan 12, 1999

L4: Entry 5 of 8

US-PAT-NO: 5858240
DOCUMENT-IDENTIFIER: US 5858240 A

TITLE: Nanofiltration of concentrated aqueous salt solutions

DATE-ISSUED: January 12, 1999

INVENTOR-INFORMATION: NAME	CITY	STATE	ZIP CODE	COUNTRY
Twardowski; Zbigniew	Burnaby			CAX
Ulan; Judith G.	Richmond			CAX

US-CL-CURRENT: 210/652; 210/639, 210/641, 210/651, 210/653, 210/805

Full | Title | Citation | Front | Review | Classification | Date | Reference | KWIC | Draw Desc | Image

6. Document ID: US 5458781 A

L4: Entry 6 of 8 File: USPT Oct 17, 1995

US-PAT-NO: 5458781
DOCUMENT-IDENTIFIER: US 5458781 A

TITLE: Bromide separation and concentration using semipermeable membranes

DATE-ISSUED: October 17, 1995

INVENTOR-INFORMATION: NAME	CITY	STATE	ZIP CODE	COUNTRY
Lin; Kaung-Far	Baton Rouge	LA		

US-CL-CURRENT: 210/651; 210/641, 210/652, 423/504

Full | Title | Citation | Front | Review | Classification | Date | Reference | KWIC | Draw Desc | Image

7. Document ID: US 5158683 A

L4: Entry 7 of 8 File: USPT Oct 27, 1992

US-PAT-NO: 5158683
DOCUMENT-IDENTIFIER: US 5158683 A

TITLE: Bromide separation and concentration using semipermeable membranes

DATE-ISSUED: October 27, 1992

INVENTOR-INFORMATION: NAME	CITY	STATE	ZIP CODE	COUNTRY
Lin; Kaung-Far	Baton Rouge	LA		

US-CL-CURRENT: 210/651; 210/652, 423/504

Full | Title | Citation | Front | Review | Classification | Date | Reference | KWIC | Draw Desc | Image

8. Document ID: US 4927540 A

L4: Entry 8 of 8 File: USPT May 22, 1990

US-PAT-NO: 4927541
DOCUMENT-IDENTIFIER: US 4927541 A

TITLE: Ionic complex for enhancing performance of water treatment membranes

DATE-ISSUED: May 22, 1990

INVENTOR-INFORMATION:				
NAME	CITY	STATE	ZIP CODE	COUNTRY
Wessling; Ritchie A.	Midland	MI		
Whipple; Sharon S.	Sanford	MI		
Fibiger; Richard F.	Midland	MI		

US-CL-CURRENT: 210/636; 210/490, 210/500.27, 210/500.34, 210/500.37, 210/500.41, 210/654

Full | Title | Citation | Front | Review | Classification | Date | Reference

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L8: Entry 1 of 6 File: USPT Jul 1, 2003

DOCUMENT-IDENTIFIER: US 6258276 B1
TITLE: Microporous membranes and uses thereof

BSPR:
Membranes are used, for instance, in separation processes as selective barriers that allow certain chemical species to pass, i.e., the permeate, while retaining other chemical species, i.e., the retentate. Membranes are used in many applications, for example as biosensors, heparinized surfaces, facilitated transport membranes utilizing crown ethers and other carriers, targeted drug delivery systems including membrane-bound antigens, catalyst-containing membranes, treated surfaces, sharpened resolution chromatographic packing materials, narrow band optical absorbers, and in various water treatments which involve removal of a solute or contaminant, for example, dialysis, electrodialysis, microfiltration, ultrafiltration, reverse osmosis, nanofiltration and in electrolysis and in fuel cells and batteries.

DEPR:
Microporous polypropylene or polyethylene membranes which have in situ polymerized vinylpyridine and which are cross-linked with about 0.25 to about 1 wt % by weight of the total monomers by divinylbenzene are particularly useful in pressure driven water treatment, i.e. reverse osmosis or nanofiltration cations in preference to monovalent reject multivalent cations in preference to monovalent cations. By varying the degree of properties of the cross-linking, the membrane may be modified to be specific for specific applications. Such membranes are considered novel and constitute one aspect of the invention.

DEPR:
The rejection of salts containing monovalent cations, for example, Na.sup.+, is subsequentially lower than rejection of salts with multivalent cations, for example, Mg.sup.2+, Ca.sup.2+. Charged organic materials, such as organic acids and salts, also are rejected by the membranes, while relatively large non-ionic organic molecules, such as sucrose, have low rejections by the membranes. The ability of the membranes to function at such ultra-low pressures and their distinctive pattern of separations distinguishes the membranes from other commercially-available nanofiltration or reverse osmosis membranes, which function only effectively at higher pressures.

DEPR:
Existing commercial membranes used for water softening are limited by an excessive and indiscriminate rejection of all dissolved species and this is particularly true with thin-film composite membranes, commercial examples being low-pressure nanofiltration membranes available from FilmTec and Fluid Systems. Other nanofiltration membranes which have been developed specifically for removal of organic materials from water, generally humic acid derivatives, exhibit a low removal of ions, including calcium. The recommended operating pressures for commercially available low pressure nanofiltration membranes are higher than those found to be sufficient for the invented membranes.

DEPR:
Charged membranes are used in a wide variety of electrochemical applications including electrodialysis, electrolysis, fuel cells and battery separators. A key feature of membranes for these applications are high ion-exchange capacities, low water transport, low electrical resistance, and good selectivity in terms of the transport of ions of different charge type (cations versus anions).

DETL:

TABLE I Characteristics of thin-film composite [illegible] membranes
Rated Permeability Operating Flux at Rated L/m.sup.2 h kPa Pressure kPa Pressure
L/m.sup.2 h gpd/sq ft Membrane Material psig gpd/sq ft psig NaCl (mg/L)
modified 483 (70) 37 (22) 0.118 (0.48) aromatic polyamide TFCS.sup. 2 modified
522 (80) 26 (15) 0.049 (0.20) aromatic polyamide NTR7450.sup. 3 sulfonated ***
143 (93) (55) 0.106 (0.43) polyether sulfone NTR7410.sup. 3 sulfonated *** 14
496 (292) 0.185 (0.75) polyether sulfone .sup. 1 FilmTec, Minneapolis, Minn.
.sup. 2 Fluid Systems, San Diego, CA. .sup. 3 Nitto Denko from Hydranautics,
San Diego, CA.

DETL:
TABLE I Characteristics of thin-film composite (TFC) nanofiltration membranes
Rated Permeability Operating Flux at Rated L/m.sup.2 h kPa Pressure kPa Pressure
L/m.sup.2 h (gpd/sq ft Membrane Material (psig gpd/sq ft psig NaCl (mg/L)
modified 483 (70) 37 (22) 0.118 (0.48) aromatic polyamide TFCS.sup. 2 modified
522 (80) 26 (15) 0.049 (0.20) aromatic polyamide NTR7450.sup. 3 sulfonated ***
143 (93) (55) 0.106 (0.43) polyether sulfone NTR7410.sup. 3 sulfonated *** 14
496 (292) 0.185 (0.75) polyether sulfone .sup. 1 FilmTec, Minneapolis, Minn.
.sup. 2 Fluid Systems, San Diego, CA. .sup. 3 Nitto Denko from Hydranautics,
San Diego, CA.

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Search Results - Record(s) 1 through 6 of 6 returned

1. Document ID: US 6258276 B1

L8: Entry 1 of 6 File: USPT Jul 10, 2001

US-PAT-NO: 6258276
DOCUMENT-IDENTIFIER: US 6258276 B1

TITLE: Microporous membranes and uses thereof

DATE-ISSUED: July 10, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Mika; Alicja M.	Hamilton			CAX
Childs; Ronald F.	Dundas			CAX
Dickson; James M.	Hamilton			CAX

US-CL-CURRENT: 210/638; 210/641, 210/651, 210/654

Full | Title | Citation | Front | Review | Classification | Date | Reference | KWIC | Draw Desc | Image

2. Document ID: US 5858240 A

L8: Entry 2 of 6 File: USPT Jan 12, 1999

US-PAT-NO: 5858240
DOCUMENT-IDENTIFIER: US 5858240 A

TITLE: Nanofiltration of concentrated aqueous salt solutions

DATE-ISSUED: January 12, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Twardowski; Zbigniew	Burnaby			CAX
Ulan; Judith G.	Richmond			CAX

US-CL-CURRENT: 210/652; 210/639, 210/641, 210/651, 210/653, 210/805

Full | Title | Citation | Front | Review | Classification | Date | Reference | KWIC | Draw Desc | Image

3. Document ID: US 5587083 A

L8: Entry 3 of 6 File: USPT Dec 24, 1996

- US-PAT-NO: 5587083
DOCUMENT-IDENTIFIER: US 5587083 A

TITLE: Nanofiltration of concentrated aqueous salt solutions

DATE-ISSUED: December 24, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Twardowski; Zbigniew	Burnaby			CAX

US-CL-CURRENT: 210/652; 210/651, 210/653

Full | Title | Citation | Front | Review | Classification | Date | Reference | KWIC | Draw Desc | Image

4. Document ID: US 5522995 A

L5: Entry 4 of 6 File: USPT Jun 4, 1996

US-PAT-NO: 5522995
DOCUMENT-IDENTIFIER: US 5522995 A

TITLE: Process for recovering organic acids from aqueous salt solutions

DATE-ISSUED: June 4, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Cockrem; Michael C. M.	Madison	WI	53705	

US-CL-CURRENT: 210/637; 210/259, 210/654

Full | Title | Citation | Front | Review | Classification | Date | Reference | KWIC | Draw Desc | Image

5. Document ID: US 5147553 A

L5: Entry 5 of 6 File: USPT Sep 15, 1992

US-PAT-NO: 5147553
DOCUMENT-IDENTIFIER: US 5147553 A

TITLE: Selectively permeable barriers

DATE-ISSUED: September 15, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Waite; Warren A.	Burlington	MA		

US-CL-CURRENT: 210/654; 210/490, 210/500.34, 427/245

Full | Title | Citation | Front | Review | Classification | Date | Reference | KWIC | Draw Desc | Image

6 Document ID: US 5118424 A

L#: Entry 6 of 6 File: USPT

US-PAT-NO: 5118424
DOCUMENT-IDENTIFIER: US 5118424 A

TITLE: Thin film composite membranes from vinyl and related nomomers

DATE-ISSUED: June 2, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
McRae; Wayne A.	Zurich			CHX

US-CL-CURRENT: 210/653; 210/490; 210/500.27; 210/500.28; 210/500.37; 210/500.41; 210/500.42; 210/500.43; 210/654; 264/45.1

Full | Title | Citation | Front | Review | Classification | Date | Reference | KWIC | Draw Desc | Image

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IBM Technical Disclosure Bulletins

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USPT	l7 and charge	6	L8
USPT	l6 and polyamide	11	L7
USPT	nanofiltration and tfc	14	L6
USPT	l4 and nf	5	L5
USPT	l1 and nanofiltration and polyamide and charge	8	L4
USPT	l1 and nanofiltration and tfc	4	L3
USPT	l1 and hirose	12	L2
USPT	210/638	1939	L1